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ABSTRACT

This document outlines the computer education plan for a school district in Ohio. The district's philosophy and goals and the philosophy toward computer education are presented first. Listed are student goals and objectives for K-12, staff goals and objectives, student access to computers, and the student sequence of program scope, with objectives specified by level. Uses of the computer in each subject area are then delineated. A teacher's checklist for preparing a unit that integrates the computer is provided and evaluation is briefly noted. The appendix contains background information on the preparation of the guidebook, as well as selected references. (MNS)

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District Computer Plan K - 12

Northeastern Local School District

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DISTRICT COMPUTER PLAN

NORTHEASTERN LOCAL SCHOOL DISTRICT

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AUTHORITY

Elementary and Secondary Minimum Standards,
Ohio Department of Education, 1983

3301-35-02

B. Curriculum and instruction shall be characterized by systematic planning, articulation, implementation and evaluation.

1. Courses of study shall establish the basis for curriculum and instruction.

a. A course of study shall be adopted for each subject taught. Each course of study shall:

(i) Comply with the provisions of section 3313.60 of the Revised Code;
(ii) Be based upon the philosophy of education and educational goals;
(iii) Prescribe what is to be taught;
(iv) Specify subject matter objectives;
(v) Establish a scope and sequence;
(vi) Provide a basis for pupil evaluation.

b. Courses of study shall provide for the following topics to be a part of the curriculum: career education, citizenship, human relations education, multicultural education, energy and resource conservation education, and instruction in study skills.

c. Courses of study shall be reviewed and updated at least once every five years.

INTRODUCTION

We believe the computer is a tool used to enhance all content areas for every ability student. Additionally, it has a content of its own. Both the tool and its unique content could be incorporated into all disciplines and grade levels through a variety of hands-on experiences.

Becoming computer literate is not just knowing how to program. It requires a broad base of experiences with computers which includes word processing, data base management, computer assisted instruction, programming, and information retrieval. These experiences should reflect a framework which appropriately places computers into society now and in the future.

Computer Education is a subject area new to the district. While some staff members have acquired formal computer training, it is a skill which is not uniform throughout the entire staff. Therefore, this document provides staff program goals and objectives as well as student program goals and objectives.

Staff inservice will be a key component to the success of this computer education program. The staff must be aware of the best use of computers, and other instructional media, if they are to make appropriate instructional decisions for student learning.

The district may also wish to consider at a later time, instructional opportunities made available to community members.

The development of this document is an initial step to formalize a new instructional area. Progress toward the attainment of these goals will need to be monitored and the document revised as computer uses and applications develop which meet instructional needs and student needs.

DISTRICT PHILOSOPHY AND GOALS

"WE BELIEVE in the dignity and inherent worth of every individual. We accept every child as he is when he enters our schools. We recognize that each child has different abilities, interests and needs to which our curriculum must be suited. We shall do our utmost to help each child develop his potentialities to the fullest extent so that he may become a socially and economically productive member of our democratic society.

"WE BELIEVE in the American way of life which permits the individual to choose his own way of life as long as it does not interfere with the rights and property of others. To perpetuate this belief we must guide the child in the development of critical and scientific thinking so that he can reach valid decisions concerning our society. We must stimulate in each child a respect for and loyalty to our American heritage and a deep conviction of his personal responsibility for contributinh to it.

"WE BELIEVE that we must guide all school activities toward the following goals:

1. That students will be encouraged to understand and utilize their knowledge rather than merely memorize facts.

2. That students will develop desirable traits of mental and physical health.

3. That students will develop value systems, including ethical and spiritual values, that are compatible to the values of the culture.

4. That students will be encouraged, through practice, to continue the use of efficient methods of developing skills, values, thought processes, and factual information throughout their lives."

(Administrative Handbook, section 1200)

COMPUTER EDUCATION PROGRAM PHILOSOPHY

Effective communication with computers requires that students know principles, procedures and limitations of computer systems, and can use computers as a tool for inquiry, problem solving and information management.

The extensive use of computers in our society today and the expectations that computers will become even more pervasive in the future, necessitates that students of the Northeastern Local School District are able to communicate effectively with and receive information from computers as part of their general education.

DISTRICT-WIDE GOALS K-12

Student Goals and Objectives

I. Students will understand how a computer functions, how computer hardware operates, and will use computer software as a tool for learning.

II. Students will be able to communicate effectively with the computer.

- A. Students will acquire keyboarding skills.
- B. Students will use computers as a tool for problem solving, information management, and for creative expression.
  1. Through commercial software and data bases.
  2. Through programming.

III. Students will understand the impact of computers on society.

- A. Students will examine the current and projected impact of computers on society.
- B. Students will know and value ethical obligations and legal responsibilities related to computer use.
- C. Students will become aware of the historical background and development of computers.

Staff Program Goals and Objectives

We are strongly in favor of providing inservice to the staff in the appropriate use of computers. The staff should also be encouraged to incorporate the use of computers into their instructional objectives.

I. Staff will be inserviced on appropriate instructicnal activities for students.

   A. Staff will be inserviced on the use of computer programs which are appropriate for specific instructional objectives.

   B. Staff will be inserviced about criteria used in computer software selection.

II. The staff will be inserviced to apply appropriate classroom management techniques.

   A. The staff will be inserviced on classroom management techniques which facilitate the appropriate use of computer software programs.

   B. The staff will be inserviced on computer programs for instructional management.

STUDENT ACCESS TO COMPUTER INSTRUCTION

Grades K - 6

Computer instruction will be integrated across the curriculum into classroom instruction. Teachers who are interested in computer-assisted instruction will be encouraged to incorporate it, as they feel is appropriate, to their instructional objectives.

Grades 7 - 8

Computer instruction will become formalized in a required computer literacy class in order to guarantee each student a variety of broad based beginning level experiences in computer literacy. A touch typing course might be considered at a later date if machines, staff, time and software are available.

Integrated computer-assisted instruction will continue to be provided across the curriculum as is appropriate.

Grades 9 - 12

Computer instruction will be met through electives in extended literacy courses as well as through programming classes, computer application classes, and in business classes.

Additional experiences will also be provided across the curriculum as is appropriate to subject matter content and concepts.

STUDENT SEQUENCE OF PROGRAM SCOPE

Grades K-6: These are skills and abilities in which students may be provided instruction.
Grades 7-8: These skills and abilities will be made available to students through formal literacy instruction.
Grades 9-12: Elective optional classes will provide high school students with opportunities to specialize in areas of interest or need.
As specific high school classes are developed, course by course instructional objectives will be developed which reflect the broad program goals outlined here.

GOAL 1: Students will understand how a computer functions, how computer hardware operates, and will use computer software as a tool for learning.

K-3	4-6	7-8	9-12
1. Differentiate software and hardware. 2. Demonstrate proper care of software/ hardware: -software storage 3. Identify parts of a computer system: -key board -monitor -printer -power pack -floppy disk 4. Demonstrate how to insert the disk, turn on the computer, boot the system, turn the system off. 5. Run a program from the catalog or a menu. 6. Use appropriate terms when talking about computers: -cursor -load -run -save -print -menu/catalog -program	1. Differentiate software and hardward. 2. Demonstrate proper care of software/ hardware: -software storage 3. Identify parts of a computer system: -keyboard -monitor -printer -power pack -floppy disk 4. Demonstrate how to insert the disk, turn on the computer, boot the system, turn the system off. 5. Run a program from the catalog or a menu. 6. Use appropriate terms when talking about computers: -cursor -load -save -print -menu/catalog -program 7. Understand the concept of machines. 8. Explain how a computer is a machine. 9. Define computer terms: -input-output 10. Demonstrate the ability to save a program with application programs. 11. Define characteristics of computers. 12. Explain how computer components interact with one another.	1. Classify computer components as input, memory, central processing and output. 2. Discuss differences between a computer and an arcade game. 3. Compare the human brain to the computer. 4. Discuss advantages and disadvantages of computers. 5. Identify common tasks which are not suited for computers. 6. Hypothesize about the limitations of computers. 7. Name different uses of computers. 8. Explain why it is important to be accurate in the preparation and entering of data into the computer. 9. Define: monitor, keyboard, CPU, peripheral device, ROM, RAM, bit, byte, terminal, program, load, save, compile, file, programming language, character, program bug, hard copy, subroutine, computer error, cursor, program error, input error, program termination, disk storage, run, BASIC, 40/80 column. 10. Learn how to format a disk for your computer.	1. Identify and define a computer system. - Central Processing Unit Control Unit Arithmetic Logic Unit - Different types of input and output devices 2. Recognize capabilities of different computer types (sizes, brands and special purpose machines): - memory size - cassette vs. disk - main frame, mini, micro - DOS and Prodos - different chips 3. Explain how a computer stores data: - main storage - secondary storage - addresses - registers 4. Discuss advantages and disadvantages of computers 5. Determine proper action if system or component(s) does not respond correctly. 6. Review computer terms and use terms within context of course correctly.

GOAL II. Students will be able to communicate effectively with the computer.

Objective A: Students will acquire keyboarding skills.

K-3	4-6	7-8	9-12
1. Develop keyboard skills: -identify and use letters and numbers -identify and use common and special purpose keys	1. Use the keyboard to provide the necessary input and direction required to process a pre-written program including the operation of the following keys: -return -cursor control -arrows -reset -number keys -control keys -backspace -delete -open and closed apple, space bar and other specialized keys as needed.	1. Use the keyboard to provide the necessary input and direction required to process a pre-written program including the operation of the following keys: -return -cursor control -arrows -reset -number keys -control keys -backspace -delete -open and closed apple, space bar and other specialized keys as needed.	Students will have had a one-semester typing course as a prerequisite to computer electives.

Objective B: Students will use computers as a tool for problem solving, information management, and for creative expression.

B-1: through commercial software and data bases

K-3	4-6	7-8	9-12
1. Develop perceptual skills. 2. Use and interact with a variety of programs such as drill and practice, simulations, tutorial and problem solving. 3. Develop readiness skills.	1. Demonstrate specific uses of the computer. 2. Use and interact with a drill and practice program, a simulation program, a problem solving program, and a tutorial program. 3. Use critical skill programs in Math, English, Science or Social Studies. 4. Exposure to word processing. 5. Exposure to the concept of databases.	1. Demonstrate specific uses of the computer. 2. Use and interact with drill and practice, simulations, problem solving and tutorial. 3. Use critical skills programs in Math, English, Science, or Social Studies. 4. Use word processing programs. 5. Introduce database concept. 6. Use tutorial programs for key boarding and programming.	1. Use a database. 2. Use a computer to do: -college selection -SAT/CBE preparation -career information 3. Use a computer to do: -database management -spreadsheets -word processing -utility disks (print shop)

B-2: through programming

K-3	4-6	7-8	9-12
	1. Follow a procedure for a familiar task to teach flow charting. 2. Modify a procedure. 3. Help to develop a procedure. 4. Use procedures to perform new tasks. 5. Apply procedures and skills to new problems. 6. Develop procedures for organizing data.	1. Learn programming language: Logo and/or BASIC. 2. Know basic programming strategies: -read a flow chart or program outline -develop a flow chart or other program outline 3. Perform basic programming skills: -explain the concept of programming -perform simple procedures using commands to: copy a simple program, save a simple program, delete all or part of a program -explain simple error messages -use editing procedure to correct programs -predict computer output given a program list -apply problem solving strategies effectively using a computer program 4. Use fundamental statements and commands. 5. Create and run a simple program. 6. Read a simple program and describe what it will do. 7. Break down a problem into simple logical steps which lead to its solution. 8. Describe the process of flow charting and show an ability to read and follow one. 9. Create a flow chart to show the processes used to acomplish an ordinary task in their life. 10. Create graphics.	1. Describe uses of several computer languages including BASIC, FORTRAN, COBOL, ASSEMBLER and PASCAL. 2. Perform specific programming skills in a computer language such as BASIC, FORTRAN, COBOL, ASSEMBLER or PASCAL. 3. Modify existing programs in a computer language. 4. Create graphic designs in a computer language. 5. Develop and apply strategies for debugging programs. 6. Clearly define a problem or task which can be programmed on a computer. 7. Complete a strategy for solving the problem or completing the task and chart the solution using simple flowcharting techniques. 8. Code the program. 9. Test the program and make any necessary modifications to have it run successfully. 10. Write documentation necessary for others to understand and use their program. 11. Use the appropriate computer statement to generate sounds. 12. Use the appropriate computer statement to graph lines. 13. Explain the need for proper planning and care in program planning and care in program preparation to ensure good results. 14. Evaluate differences in programs that affect time and efficiency in execution.

GOAL III: Students will understand the impact of computers on society.

Objective A: Students will examine the current and projected impact of computers on society.

K-3	4-6	7-8	9-12
	1. Describe how computers affect our lives. 2. Describe common uses of computers. 3. Explain ways computers affect people's lives. 4. Identify computer-related occupations. 5. List values of computer skills for future employment.	1. Identify how and why computers are used in the areas of medicine, transportation, business communications, law enforcement, industry, education, aerospace, printing, etc. 2. Identify at least four computer careers and describe the job, the training required and the job potential. 3. Suggest two future applications for computers. 4. Identify what it means to be computer literate and three reasons why he/she should be computer literate. 5. Describe how computers affect our lives. 6. Demonstrate common uses of computers. 7. Show examples of ways computers affect people's lives. 8. Explore computer-related occupations. 9. Include computer skills for future employment in career plans.	1. Use computers to locate needed college or advanced training information. 2. Actively explore the place of computers in a variety of career options. 3. Participate in a complete assessment of career interests, aptitudes and abilities.

Objective B: Students will know and value ethical obligations and legal responsibilities related to computer use.

K-3	4-6	7-8	9-12
		1. Explain copyright laws as they relate to computer programs.	1. Understand the moral issues involved with computer use. 2. Discuss moral, ethical and legal issues resulting from widespread use, including copyright. 3. Recognize that computers should not be used to commit crimes. 4. Recognize that identification codes and passwords are used to restrict access to use of computer systems, programs and data files. 5. Identify advantages and disadvantages of a database containing personal information on a large number of people. 6. Recognize that computerization both increases and decreases employment. 7. Recognize that computerization both personalizes and impersonalizes procedures.

Objective C: Students will become aware of the historical background and development of computers.

K-3	4-6	7-8	9-12
	1. Read biographies of inventors Pascal, Jacquard, Babbage, Hollerith, Eckert and others.	1. Identify the four generations of the modern computer and how each was an improvement over its predecessor: vacuum tube, transistor, integrated circuit, microchip. 2. Discuss the characteristics of the microchip -reliability -compactness -low cost -low power use and how these characteristics contributed to the microchip prevalent in society today and in the future.	1. Name early counting devices. 2. Identify the types of early data programs and the tasks for which they were used. 3. Identify the inventors and their inventions which contributed to the development of the modern computer: Pascal, Jacquard, Babbage, Hollerith and Eckert. 4. Identify the four generations of the modern computer and how each was an improvement over its predecessor: vacuum tube, transistor, integrated circuit, micro chip. 5. State the difference between an analog and a digital computer and be able to give some applications for an analog system.

COMPUTER ASSISTED INSTRUCTION

ACROSS THE CURRICULUM **

An important aspect of the computer education program is the integration of the computer as a tool to assist and/or reinforce content area instruction. The following are offered to suggest initial direction for the staff as they begin to explore the most effective uses of computers in their instructional program. The suggested used are not intended to be all inclusive but do demonstrate how the computer can be used across the curriculum.

LANGUAGE ARTS

COMMUNICATIONS/DRAMA

- Uses focus on: 1) management - computer keeps an inventory list of company sets, costumes, props, lights; and, 2) management - computer word processor makes script changes, stage direction changes, and lighting sequence changes

HUMANITIES

- Use the basic structural elements of language and the concepts for combining them
- Use CAI units for capitalization, composition, editing, grammar, poetry, punctuation, research, spelling, usage, vocabulary
- Use programs to identify key ideas in reading literature and philosophy
- Use programs that require a problem solving approach for stylistic analysis (e.g. discover patterns in literature and test for possible interpretations)
- Use the word processing capability of the computer. Word processors designed for students can help them to learn and apply: 1) spelling, 2) grammar and punctuation, 3) the organization of ideas and information, 4) the creative process of writing, 5) the editing and revision of compositions, and 6) typing skills

** These suggestions are further explained in:

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- Use quality, interactive software designed to provide experiences meeting other language arts objectives, such as reading comprehension

LITERATURE

- Drill and practice programs that review vocabulary and comprehension for specific stories and novels
- Tutorials to help teach outlining
- Programs that write computer poetry
- Game programs dealing with words that rhyme
- Tutorial programs that teach simple poetic forms
- Problem-solving programs that aid students in writing haiku poetry
- Simulations that deal with popular subjects such as Bigfoot, UFOs or the Bermuda Triangle, and help students develop analyzation skills
- Utilize word processing programs to help students write literary criticism
- Interactive video programs to suit many literature units
- Use of databases such as BRS to aid in locating material for reports, term papers, speeches, and debates

READING

- Drill and practice and game programs to teach phonetics and pronunciation
- Tutorials to help with reading comprehension, sequencing, and context clues
- Letter recognition games (with both upper- and lowercase) for young children
- Readability analysis utility programs for teacher use

- Drill and practice programs to complement the basal reader series the students use

- Speed reading programs that have a variety of levels

- Game programs that provide practice in alphabetizing

GRAMMAR

- Drill and practice programs to teach the parts of speech

- Game and tutorial programs to teach word usage, contractions, verb tenses, and plurals

- Drill and practice and game programs that deal with subject, predicate, and the problem of subject-verb agreement

- Drill and practice, tutorial, and game programs to teach punctuation

- Drill and practice programs that deal with common grammatical problems

- Programs to help improve writing skills such as parallel structure, excess words, sentence beginnings, and subordination

- Game programs to help elementary students construct sentences

- Tutorials to help teach the process of sentence diagramming

- Problem-solving programs that deal with the process of sentence combining and writing "adult" sentences

- Word processing programs to aid students in revising writing

SPELLING AND VOCABULARY

- Drill and practice programs that can be adapted to review the words for the week

- Word processing programs to aid in sentence and paragraph writing

- Tutorial programs that deal with pronunciation, prefixes, suffixes, or using a dictionary

- Games that allow the teacher to insert spelling or vocabulary words (A wide variety of formats are available)

- Programs that deal with acronyms, synonyms, homonyms, and antonyms

- Compound word game programs (Several are available)

- Anagram and analogy games to help build vocabulary

- Word guessing games, such as those based on the Hangman game, to help expand vocabulary

- Drill and practice programs on specific spelling problems such as dropping the final "e" when adding "ing"

- Utility programs to aid the teacher in developing word searches, crossword puzzles, and spelling drills

- Problem-solving programs that deal with solving word or analogy problems

- Vocabulary expanding programs that deal with word etymology

FOREIGN LANGUAGES

- Use drill and practice programs to provide reinforcement of vocabulary

- Use tutorial program for learning grammar and translation skills

- Drill and practice and game packages that help teach vocabulary

- Tutorial programs that teach parts of speech and grammar

- Interactive video programs designed to teach culture and history

- Use of databases to gather current information on foreign countries

MATHEMATICS

- Use the computer as a tool to execute problem-solving procedures
- Use the computer as a tool to individualize the teaching of computational skills
- Use the graphic characteristic of the computer in plotting of geometric designs
- Use simulation activities, such as games of chance (coin tossing) or games of skill (strategy games) to develop problem-solving skill, mathematical skills and concepts
- Use the computer as a tool in mathematical programming (e.g. constructing algorithms and running them on a computer)
- Use the computer as a tool in the generalization of mathematical results
- Interact with programs designed to aid concept development

BASIC SKILLS

(Note: A wide variety of tutorial, drill and practice, and game programs exist in this area.)

- Drill and practice programs dealing with addition, subtraction, multiplication, and division
- Tutorials to help teach how to add fractions
- Drill and practice games that help elementary students learn to count
- Tutorials and games to help teach counting money and making change
- Games that drill students on math facts
- Programs coordinated with the students' textbook
- Games dealing with consumer math skills
- Games about fractions, decimals, and conversions
- Simulations and games that develop problem solving and logical thinking skills
- Interactive video programs to stimulate logical thinking and problem solving (Tie these in with case studies)

ALGEBRA

- Programs that are coordinated with the text used in class
- Games to aid in learning graphing
- Tutorials that explain how to solve equations
- Drill and practice programs to help teach methods of solving equations
- Games and simulations that encourage logical thinking and problem solving
- Games that reward the user for solving equations such as Caterpillar 500 for PET and VIC computers
- Tutorials to help teach factoring and exponents
- Utility programs to help generate worksheets, quizzes, and tests
- Interactive video programs providing a game format that rewards the player's knowledge of algebra

GEOMETRY

- Tutorial programs explaining geometric properties and how to develop proofs
- Drill and practice programs that aid in graphing
- Programs to teach methods of solving word problems
- Simulations that promote logical thinking
- Games to reward students for their knowledge of graphing
- Interactive video programs dramatizing the book Flatland and containing problem-solving activities

ADVANCED MATH

(Note: There are a myriad of drill and practice and tutorial programs that deal with appropriate topics in this area.)

- Simulations and games to aid in developing logical thinking and problem-solving behavior

- Programs that can be used to demonstrate a concept to the entire class (for example, Super Math Package for the Apple computer)

ECONOMICS

- Tutorials and interactive video programs to teach elementary students about community workers

- Simulations/games about running a business (for example, Lemonade for the Apple computer)

- Simulations that deal with the economic implications of running a kingdom

- Tutorials and games on the topics of energy conservation and developing energy sources

- An interactive video program that deals with a case study of a particular company and its problems

- A game about money and barter

- An interactive video program concerning decision making and deciding between wants and needs

- Graph-producing programs to help students illustrate concepts

- Interactive video programs to teach different aspects of advertising

- A simulation dealing with transportation of goods such as Trucker, Streets of the City™ for Apple, PET, and Atari computers

SCIENCE

HEALTH

- Tutorial and game packages for elementary students that deal with nutrition, visits to the dentist, and good sleep habits
- Drill and practice programs to aid in learning new vocabulary
- Tutorials to help teach about organs of the body
- Games that reinforce good health habits
- Simulations to teach good safety practices
- Interactive video programs on first aid
- Simulations to provide practice in selecting the correct first aid procedures
- Simulations that offer practice in dealing with stress
- Games that provide practice in decision making
- Interactive video programs on case studies for practice in making decisions regarding good health

CHEMISTRY

- Utility programs to aid with lab calculations
- Simulations that deal with pH balance
- Drill and practice programs on chemical elements
- Tutorials explaining lab procedures
- Programs about atoms, complete with graphics
- Tutorials and drill and practice on balancing chemical equations
- Simulations dealing with lab situations that are too time-consuming or dangerous for the classroom
- Programs coordinated with the textbooks being used
- Interactive video programs about nuclear reactions and other dangerous procedures

BIOLOGY

- Drill and practice programs that help teach new vocabulary
- Tutorials to help emphasize concepts in the textbook
- Simulations and games about ecology and the food chain
- Simulations that deal with population growth
- Animated programs demonstrating cell division and osmosis
- Utility programs to aid in lab experiments
- Tutorials that explain lab procedures
- Simulations to illustrate interaction between species
- Simulations dealing with enzyme-catalyzed reactions that are difficult to obtain in laboratory situations
- Simulations that promote logical thinking and problem solving with scientific methodology
- Interactive video programs about animal life

PHYSICS

- Tutorials about atomic physics
- Drill and practice, tutorial, and simulation programs to help teach the principles of energy conservation
- Games that help teach the concept of velocity
- Tutorial programs to help explain mass
- Animated programs that illustrate wave superposition
- Simulations on mechanics and gravity (for example, Introductory Mechanics for the Apple II, by CONDUIT)
- Simulations that provide lab experiment practice
- Simulations of experiments too difficult or dangerous, or impossible to create in the classroom
- Utility programs to aid in lab calculations
- Tutorials and simulations that coordinate well with standard texts

EARTH SCIENCE

- Drill and practice and tutorial programs covering various units
- Animated programs to help teach astronomy and constellation recognition
- Games dealing with map skills
- Simulations on the topic of earthquakes and prediction methods
- Games that deal with geological timetables and dating methods
- Graphic programs to help teach about weather and the various types of weather charts
- Simulations concerning plate tectonics
- Games that reward mineral and rock classification knowledge

- Simulations about air and water pollution and soil erosion

- Games on oceanography

- Simulations and games to help teach concepts in the space and solar system units

- Interactive video programs that provide case studies on pollution and promote problem solving

- Interactive video programs that deal with earthquakes and volcanoes

- Utility programs to aid with lab experiments

SCIENCE/HEALTH

- Use simulations as an aid in understanding natural phenomena. However, use of simulations must be combined with hands-on laboratory and field activities

- Use simulations to exercise various problem-solving techniques: 1) how to use, criticize, modify, or improve a simulation for a particular purpose; and 2) how to explore relationships among variables by varying only one parameter at a time and holding all others constant

- Provide computer literacy with regard to: 1) social responsibility and values, 2) use of information in a democratic society, 3) decision-making skills, and 4) impact of technology historically and in the future

SOCIAL SCIENCES

WORLD HISTORY

- Drill and practice programs to provide practice in geography such as locating oceans, continents, and countries
- Simulations that deal with world population and how it can be handled
- Tutorials that teach early history about ancient Greek and Roman civilizations
- A game teaching the history of the Middle Ages and the culture of that time
- Simulations on ancient history and its effect on the present
- Simulations dealing with a developing country and the aid offered by a democratic superpower and a Communist superpower
- Interactive video programs to teach basic facts concerning foreign countries (Since these will be locally produced, they can be tailored to the teacher's needs)
- Simulations concerning archaeology and evaluating archaeological discoveries
- A community search simulation about an ancient society that must relocate (Such a problem-solving activity can utilize one computer with an entire class)

UNITED STATES HISTORY

- Tutorial programs that deal with the discovery of America, the westward movement, the Civil War, or other areas

- Simulations covering events of your state's history

- Tutorial and drill and practice programs that deal with state historical events

- Drill and practice programs to aid students in the study of vocabulary

- Games dealing with determining dates for historical developments such as technological and scientific inventions

- Drill and practice programs that deal with location of states and their capitals

- Programs that help explain demographics developed from the latest census

- Simulations dealing with strategic situations in history, such as the westward movement, the Revolutionary War, or slave trade

- Tutorials and games concerning inventions that have changed our lives

- Matching games that cover famous people in history

- Interactive video programs to teach information about famous people or events

- A locally produced interactive video program explaining the history of your area

PSYCHOLOGY

- Tutorial and drill and practice programs to teach vocabulary and basic concepts
- Tutorial programs that deal with case studies concerning concepts taught in the textbook
- Simulations and games offering practice with problem-solving strategies
- Simulations that deal with case histories and provide various options for solutions
- Simulations concerning various community problems and solutions
- Interactive video programs that provide practice in solving actual case studies

LIBRARY AND MEDIA SKILLS

- Learn to locate and use appropriate programs and documentation
- Learn to locate and retrieve information from computer databases

PHYSICAL EDUCATION

- Use tutorial or remedial programs to learn or review game rules or strategies involved in various sports
- Use the computer as a tool to monitor one's progress in a particular sport or activity
- Tutorials to teach the rules and scoring procedures for new games
- Drill and practice programs to help teach new vocabulary
- Simulations that help train students to serve as referees
- Interactive video programs to train students in gymnastics and other areas
- Utility programs that aid in scoring and keeping class statistics

VISUAL ART

- Use of instruction for certain fundamental concepts and skills: 1) identification and manipulation of the elements of design, 2) visual combination concepts and interpretation of the components (e.g. teaching the fundamentals of perspective and depiction of 3-D on a flat surface)

- Use as a graphic tool for developing visual concepts and graphic designs: 1) art fundamentals, 2) programming skills necessary for designing on a computer graphics system (e.g. commercial art, animation, textile crafts)

- Use for analysis and criticism. Students can use the computer to store and analyze large quantities of information to form their own critical judgments and compare them to others

- Use an interdisciplinary approach that allows students to experience in a direct way the links between the arts and between arts and science within the student's immediate experiences (e.g. social studies and art, art and music)

- Use of graphics tablets for developing computer art

- Tutorials dealing with mathematical concepts that develop artistic pictures

- An interactive video program with the videodisc An Art Awareness Collection (from MCA Disco Vision) to introduce students to famous paintings

- Games that reward the players for their knowledge of specific artists and art styles

- Classroom art shows on the computer to develop art analysis skills

- Math programs capable of producing geometric designs that can be used for string-art models

MUSIC

- Allows the student to: 1) compose music, 2) play music entered in the computer, 3) display notes on the video screen, 3) edit existing music, and 4) hear music through stereo amplifiers

- Use drill and practice that are computer-assisted for individual students to do drill following classroom instruction (e.g. stating interval distance, writing or identifying scales, recognizing rhythm patterns, identifying notes)

- Enhances the student's opportunities for learning how to read sheet music and recognize patterns

- Use game simulation strategies to teach pitch and interval recognition, dictation of melody, chords, harmony and rhythm

- Use computer as an instrument

- Use computer controlled instruments

- Use the GUIDO System

- Drill programs to aid in chord recognition

- Synthesizer programs allowing students to compose their own music

- Tutorial programs about musical notes, keys, signatures

- Drill programs that allow students to practice fingering on a wide variety of instruments

- Games that teach how to detect errors in pitch

- Drill and practice programs to help with notes, rests, treble and bass clefs, and other musical vocabulary and concepts

- Games that develop song recognition

- Drill and practice and game programs concerning rhythm recognition

- Interactive video programs that provide information about famous musicians

HOME ECONOMICS

- Use tutorial programs to learn basic procedures in sewing (e.g. correct way(s) to position a pattern)
- Use data retrieval procedures for locating recipes, inventory of supplies, etc.
- Use as a tool for measurement conversions in recipes
- Simulations on balancing a budget
- Games to help teach good eating habits
- Drill and practice programs that aid in learning vocabulary
- Tutorials teaching sewing techniques
- Programs to help students construct menus and double or halve recipes
- Tutorials about maintaining a safe home
- Tutorials explaining poisons
- Games and simulations that deal with comparative buying
- Simulations teaching how to become a good consumer
- Use of the graphics tablet to help illustrate children's books developed as a class assignment
- Programs to aid in housing design and furniture arrangement
- Games to help teach energy conservation
- Tutorials that aid in reading blueprints
- Drill and practice programs on selecting home furnishings
- An interactive video program concerning wardrobe selections and decision making
- Simulations about child care

- Tutorials that help teach characteristics of different age groups of students

- An interactive video program dealing with situations involved in child care

INDUSTRIAL ARTS

- Use simulation programs to instruct students on safety procedures to be followed in class
- Drill and practice programs that review new vocabulary
- Tutorials to help teach architectural drafting
- Simulations on designing electrical circuits
- Tutorials to aid in developing the visualization process
- Simulations that provide case studies in drafting and design
- Utility programs to aid in making necessary calculations and changes in scale
- Tutorials about different methods of joining wood
- A tutorial that helps the student plan a woodworking project
- A utility program to aid in the development of quizzes and tests
- Simulations that help in designing large woodworking projects
- Tutorials explaining the operation of various engines
- Drill and practice programs concerning energy sources
- Simulations to aid in understanding the design of various engines
- Games that reward the player's knowledge of electrical circuitry (for example, Rocky's Boots™, written for the Apple computer)
- Graphics tablets that can help students develop designs and plans

BUSINESS EDUCATION

- Use drill and practice programs to provide practice in: 1) spelling of business and technical terms
- Provide reinforcement of shorthand brief forms via the use of simulations
- Provide instruction on keyboarding skills
- Provide accounting students with an understanding of the role of computers in the storage, calculation and retrieval of financial data
- Use word processor for text creation and revision
- Provide instruction in the use of computer equipment and data processing
- Typing tutor and adding machine drill and practice programs
- Drill and practice programs that provide accounting practice (Some textbooks have accompanying computer software)
- Simulations dealing with payroll exercises
- Tutorials and drill and practice programs to teach simple and compound interest
- A utility program that develops loan amortization charts
- Simulations providing practice in running a business with all the necessary reports and paperwork
- Tutorial programs to help teach general ledger and depreciation procedures
- Simulations dealing with annuities, loans, and the stock market
- Drill and practice programs that help teach filing techniques
- Tutorials to help teach keypunching
- Drill and practice and tutorial programs to aid in teaching shorthand

- Tutorial programs about databases and data processing

- Practice on actual database management programs for microcomputers

- Utility programs that aid in debugging data processing programs developed by students

- Interactive video programs providing problems in office management

TEACHERS' CHECKLIST FOR PREPARING A UNIT THAT INTEGRATES THE COMPUTER

Will the computer be used for:
- remedial work?
- enrichment?
- required information?
- demonstrations for the entire class?

Note: Remember that you are not limited to one category of computer use.

Is the role you have assigned to the computer one that could be done just as easily with pencil and paper?

Yes No

Does commercial software exist for the material you want to teach?

Yes No

Is the commercial software of acceptable quality?

Yes No

If yes, please list titles.

_____

_____

If commercial software does not exist, are you willing to create your own software?

Yes No

Could this be an assignment for the computer programming class?

Yes No

What activities can students do when they are not using the computer?

- Work on additional assignments in the classroom
- Work on research reports in the media center
- Work on audiovisual production in the media center
- Work on independent study topics in the classroom or media center
- Work on another basis. (Please explain)

_____

_____

What dates will you need to schedule:

- The computer lab?
- The media center?
- The media specialist for a planning conference?

Use a drill and practice program to:

- Provide practice on a specific skill
- Help a remedial student
- Aid a student who is learning an advanced concept
- Help individualize the classroom

Use a tutorial program to:

- Introduce a concept
- Provide review of a difficult concept
- Help remedial students
- Provide additional material for enrichment purposes
- Help individualize the classroom

Use a simulation or problem-solving program to:

- Introduce a concept. (Use this approach with great caution.)
- Provide a review and thinking practice on a concept
- Provide remedial and/or enrichment experiences
- Provide a test on a concept or unit

Use an interactive video program to:

- Provide a visual experience the computer alone cannot
- Provide a drill and practice program
- Provide a tutorial program
- Provide a simulation or problem-solving program
- Provide a review or test

Use a utility program to:

- Produce a crossword puzzle or word search
- Produce worksheets or tests
- Calculate readability formulas
- Tackle other administrative tasks

EVALUATION

Evaluation of student computer ability will be based upon cognitive knowledge, demonstration of performance criteria and production of appropriate products.

Cognitive knowledge will be measured by at least tests of definitions, terms, historical events, labeling of parts, and descriptions of functions.

Performance measures will assess student ability to effectively use the computer as a tool to respond as the student wants.

Products can be produced by individual students or small groups of students and could include a wide variety of formats as: a successfully edited letter, a flow chart, a written documentation, a "de-bugged" program, a program, or a graphic display.

APPENDIX

DEVELOPMENTAL TIME LINE

The Northeastern Local School District began formal exploration of Computer Education in the spring of 1982 when Dr. Fratini from Battelle provided an overview for all administrators and the media staff of the district.

- County offered staff training	Summer, 1982
- RH Wittenberg grant with Dr. Krouse, in conjunction with national project	1982-83 school year
- at JVS media staff, NR staff other staff - training sessions	1982-83 school year
- January Martin Luther King Day at Northridge - examination of computer	January, 1983
- Administrative Seminar - to discuss and review packet of information to review prior to the meeting	May, 1983
- County offered staff training	Summer, 1983
- Administrative Committee and Media Council discussed	Fall, 1983
- Administrative Policy developed presented to the Board District compatability required	January, 1984
- Kenton Ridge Committee Report	April, 1984
- Media Council Report	June, 1984
- Dan Kaffenbarger Survey	August, 1984
- Lottery Money	Fall, 1984
- Course of Study Committee formed	October, 1984
- Building level staff inservice to acquaint staff with uses	January/February, 1985

SURVEY OF AREA BUSINESSES IN THE FIELD OF COMPUTER SCIENCE

Conducted by Dan Kaffenbarger
for the
Northeastern Local School District
June, 1984

BUSINESSES SURVEYED:

Manufacturing	Financial Institutions	Misc. Businesses
Bomag, U.S.A.	Bancohio	Springfield AAA
Kelsey-Hayes	City Loan & Savings	Columbia Gas
J. W. Pence Mfg.	The Kissell Co.	Personnel Division of Clark County
Robbins & Myers	M & M Federal	Ohio Warehousing
International Harvester		Manpower Temporaries
Cascade		Norell Temporaries
Huffy Corp.		
General Motors		
Midland-Ross		

Each business was asked tow basic questions to aid the district in establishing a relevant computer program.

1. What computer skills should our students have to equip them for a computer-related job in your company?
2. Are there other courses you would recommend students to take in conjunction with the computer curriculum?

Below is a summary of the responses received to question one. There were a total of 20 miscellaneous businesses surveyed in the Springfield-Dayton area. The percentage cited beside each response indicates how often that computer-related skill was mentioned as an important one to include in the computer curriculum. Many businesses did cite more than one skill as important.

RESPONSES TO QUESTION 1.

60% suggested a general introductory course to computers to make students more aware of the potential uses for computers. This would also emphasize terminology connected with the field.

40% suggested that students have some knowledge of word or data processing.

35% suggested that hands-on experience with personal computers is an important skill to develop in the students.

15% suggested that a basic understanding of the keyboard and its function was important.

20% saw a knowledge of the various operating functions of computer systems as a vital skill to possess.

15% cited basic programming as an important skill to be developed while in high school.

15% suggested that one of the four common types of computer language be taught, others even suggested learning two or more of these languages to make the student more adaptable.

10% of the businesses stated that familiarity with input-output devices and the ability to modify data should be taught at the high school level.

5% of the businesses suggested that students be taught specific skills on the IBM computer.

25% of all of the businesses surveyed stated that no prior computer training was needed at the high school level.

RESPONSES TO QUESTION 2.

35% of the businesses suggested typing.

25% favored some type of accounting course.

15% stated that basic math skills would be helpful.

5% suggested an office procedures course be take.

20% cited English courses are important, especially in the areas of verbal and written communication.

20% suggessted some type of general business course.

5% suggested higher math, such as Algebra, be a recommended course.

10% of the businesses stated that no other courses were needed with the computer curriculum.

RECOMMENDATIONS FROM THE SURVEYED INFORMATION:

Suggested Computer Courses might include the following four courses, based on the information received from area businesses. These suggested courses are prioritized according to the general emphasis placed on the skills included in these courses.

1. General Introductory Course to familiarize students with computers and their place, with the emphasis on terminology connected with the field.
2. A course in which students receive a "hands-on" experience with personal computers.
3. A course which introduces data and word processing.
4. A more advanced course might include the operation of various computer functions. These functions might include -- input-output devices, modifying data, or basic programming.

The four areas listed below are those cited by businesses as courses to be emphasized along with the computer courses. Again these are listed in the priorities of area businesses.

1. Typing
2. English - especially in the verbal and written areas of this discipline
3. Accounting
4. Courses in Basic Business

SURVEY OF AREA COLLEGES AND UNIVERSITIES
ON ESTABLISHING A COMPUTER CURRICULUM

Below is the summary of comments made by five area institutions of higher learning concerning the types of courses we should offer to students in the area of computer science. Though all od the institutions teach courses for students with no training, most did agree that they would soon phase out such introductory courses as more and more of their incoming freshmen appear to be computer literate.

Wittenberg University

Wittenberg suggested that the district offer a general course in computers to simply make students familiar with the function of this tool. They also suggested that the students be given practical "hands-on" experience with personal computers. They also recommended establishing courses in basic programming, word processing, and one which familiarizes them with a computer language; they suggested teaching basic.

Along with the computer courses Wittenberg also recommended higher level mathematics courses., verbal and written communication courses.

Urbana College

Urbana suggested that we offer a limited selection of computer courses. They, too, recommended that a general introductory course in computer awareness be offered; what happens inside the computer. The only other course that they suggested would be one to familiarize the student with one of the four common computer languages: Pascal, Basic, Cobol, or Fortran.

Along with these two basic courses Urbana suggests that students take courses in higher mathematics (especially algebra) and that they should have physics.

Cedarville College

Cedarville suggested that the district implement only very basic offerings. They too recommended only two offerings: 1) a course in computer application, a very general course that would include an introduction to computer logic, 2) a course which instructs students in BASIC computer language.

Along with the computer courses Cedarville recommended algebra, trigonometry, and some type of accounting course since most computer usage falls into the area of business.

University of Dayton

Dr. Dean of the university gave an example of a high school curriculum in computer science currently being used in some systems in Oregon. Below is a brief summary of those four courses. This computer program suggests two semester courses at the 10th grade level, to be followed by two full-year courses for the 11th and 12th grades.

Course 1 (10th grade, 1st semester):

Computers and Society - this course teaches the basic application of computers in society along with a theory or two about computer implication. It would include no programming.

Course 2 (10th grade, second semester):

Programming Course - this course would teach low level programming. It would use and instruct the students in BASIC computer language.

Course 3 - 4 (11th and 12th grade, each one full year):

These two courses would prepare the student for the national A.P. exam in computer science. It would be giving them the content of their first typical college computer science course. They would be taught the Pascal computer language because that is what is used on the national A.P. exam.

It should be noted that Dr. Dean emphasized that to offer courses two through four as mentioned in the course of studies, a district must have a faculty that is very knowledgeable and competent in the field of computer science.

Ohio State University

The head of the Computer Science Department emphasized the adequate training of faculty members before adopting a course of study. To teach the three courses he mentioned he suggested that the instructor have at least the first two years of a computer science major achieved before he is allowed to teach. This translates into about 20 quarter hours of computer science. He also stated that the person instructing the class should be on a degree above those he is teaching. He also suggests that the student learn the Pascal computer language because it is a "good teaching language."

Ohio state has recommended a basic computer literacy course, one that will teach students basic terminology and make them familiar with various uses of computers. The second course should introduce the students to Pascal programming. The final course at the high school level should give the application of

computers in other disciplines such as social studies, English, and mathematics. It would be a more practical, interdisciplinary approach and it might require team-teaching.

Along with the computer courses Ohio recommended a strong mathematics background to successfully prepare our students for computer science in college.

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Graduate Classes - Wright state University, University of Dayton, Clark Technical College

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Computers for Education
Introduction to BASIC for Educators
Advanced Computers in Education
BASIC Programming
Program Design Methods
Introduction to Data Processing
System Analysis
Computer Operating Systems
COBOL Programming
Using Micro-Computers in the Library

Workshops

Microcomputers in the Library - State Library of Ohio, January, 1983
Computer Library Ciculation Systems - CCIS, November, 1984
OELMA Conference Seminars, October, 1984
SOITA Conference Seminars
GMVECC - Dayton Conference - Second Step in Computing, December, 1984
WOEA - Dayton, Fairborn, October, 1984
NECC - 6th Annual National Educational Computer Conference, June, 1984
3rd Annual Computer Fair - Ohio Department of Education, April, 1984
Hands-On Miami University Computer Workshop, February, 1983

Inservice

Battelle Speaker, February, 1982
Clark County Presentations in Buildings and in the Summer
Introduction to Computer Lab at JVS
Martin Luther King Day - District, January, 1984
Troy City Schools

Memberships

User's Group Meetings at Troy and at Northwestern
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Susan Berg - Beavercreek Schools
Sue Heckler - Clark County Schools
Cassie Rogers - New Carlisle-Bethel Schools
Dr. William Kraus - Wittenberg University
Ross Votaw - Springfield City Schools
Nancy Kaech - SOITA
Jerry Gochenour - Tech 2000